REMARKS

The Examiner is thanked for the careful examination of the application, and for the courtesy of the interview granted Applicant's attorney on June 12, 2007. The arguments raised at the interview are set forth herein.

Double Patenting:

With regard to the provisional obviousness-type double patenting rejection, the Examiner requests that the rejection be held in abeyance until the rejection is no longer provisional.

Art Rejections:

Claims 1, 2, 4, 7-13, 14, 16, 18,-21, 25, 28-31, 34 and 35 have been rejected under 35 U.S.C. §102(b) as being allegedly anticipated by U.S. Patent No. 6,395,096, hereinafter Madanshetty. Claims 1, 19, and 28 are the only independent claims pending in the application. Accordingly, they will be discussed in detail.

Claim 1 recites a wound treatment apparatus combination that includes a tank, an electromechanical transducer, and an electrical signal generator. The electrical signal generator is operatively connected to the transducer for energizing the transducer with an alternating electrical signal that is at least partially rectified to generate ***stable cavitation*** in the water contained in the tank.

Madanshetty functions in a completely different manner. Madanshetty, to the contrary, is ***intended to induce transient cavitation***. See, e.g., column 10, lines 39-42, "As indicated above, it is preferable to induce *transient cavitation* with newly formed bubbles in order to obtain a more intense and vigorous release of energy during implosion." In fact, Madanshetty defines cavitation as the formation of cavities or bubbles in a liquid where the ensuing bubble dynamics and energy

concentration *result in implosive collapse of bubbles* that achieve unique and surprising results. See column 1, lines 50 – 54. Thus, Madanshetty teaches away from the present invention.

Furthermore, Madanshetty does not teach or suggest using a partially rectified electrical signal. In the Office Action, and at the interview, the Examiner referred to Figure 3 of Madanshetty as an alleged example of a partially rectified signal. However, Figure 3 illustrates a square wave signal having a duty cycle wherein the signal is off during predetermined periods. Applicant submits that the wave signal illustrated in Figure 3 does not include a partially rectified signal.

A partially rectified signal is a signal that, at least for one or more cycles, does not extend on both sides of the abscissa. See, e.g., Fig. 2A of the present application for an illustration of a partially rectified signal. The primary difference between the signal in Fig. 3 of Madenshetty and that of the partially rectified signal of the present invention is that the Madenshetty signal is substantially equal on both sides of the abscissa.

Since the Madenshetty signal is substantially equal on both sides of the abscissa, the bubbles will continue to expand until they exceed their critical radius, at which point they will implode. See paragraph [0006] of the present application, wherein it explains that with substantially equal expansion (rarification) and compression cycles (i.e., equal signals on both sides of the abscissa), the surface area of a bubble produced by ultrasound pressure is slightly greater during rarification than in compression cycles. Since the amount of gas that diffuses in or out of the bubble depends on the bubble surface area and skin thickness, diffusion into the bubble during rarification cycles will be slightly greater than diffusion out

during compression cycles. Thus, for each cycle of sound, the bubble expands a little more than it shrinks. In paragraphs [0007] and [0008] of the present application, it is explained that when the bubble reaches a critical radius, ***transient cavitation*** will occur with the bubble collapsing.

As set forth in the published application, the present invention uses the partially rectified signal in order to avoid inertial or transient cavitations. See paragraph [0030] of the published application, wherein it explains that a microprocessor is operatively coupled to the signal generator and the tank for determining a percentage or proportion of rectification of the electrical signal *to obviate or avoid inertial or transient cavitation*.

It is also significant to note that in paragraph [0031], the application distinguishes over the type of signal illustrated in Madenshetty. "Thus, the present invention provides an iterative, continuous full wave to half wave pressure amplitude control rather than the *current practice* of lowering acoustic intensity or employing ***on/off pulsed*** ultrasound, or lowering acoustic intensity."

Because of the use of rectified signals in the present application, there is prolonged compression of the bubble during the period of time when the signal is rectified. Accordingly, during that period, the bubbles are compressed so that they are smaller than their resonant size at the applied frequency, thereby prolonging stable cavitation. See paragraph [0071] of the present application. Accordingly, Applicant submits that Madenshetty clearly does not teach a partially rectified signal. Furthermore, Applicant submits that the difference is significant in that because of the duty cycle signal disclosed by Madanshetty, the bubbles will continue to grow

until they collapse in view of the fact that for each cycle of sound, the bubble expands a little bit more than it shrinks.

Accordingly, the signal in Madanshetty is not a "partially rectified" signal, and it functions differently, and achieves a different result than the present invention. Accordingly, Applicant submits that claims 1, 19, and 31, which require rectified wave compression cycles are not taught or suggested by Madanshetty. Accordingly, the rejection based on Madanshetty should be withdrawn.

Claim 28 recites a wound treatment apparatus that includes determining the presence of inertial or transient cavitation, and energizes the transducer with an alternating electric signal to generate stable cavitation in water.

Madanshetty, to the contrary, is ***intended to induce transient cavitation***. See, e.g., column 10, lines 39-42, "As indicated above, it is preferable to induce *transient cavitation* with newly formed bubbles in order to obtain a more intense and vigorous release of energy during implosion." In fact, Madanshetty defines cavitation as the formation of cavities or bubbles in a liquid where the ensuing bubble dynamics and energy concentration *result in implosive collapse of bubbles* that achieve unique and surprising results. See column 1, lines 50 – 54. Thus, Madanshetty teaches away from the present invention.

Claims 3, 15, and 26 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Madanshetty in view of U.S. Patent No. 6,036,644, hereinafter Schutt. The Examiner appears to be relying on Schutt for its alleged teaching of a venturi injector. However, that portion of Schutt does not overcome the deficiency of Madanshetty described above with respect to the independent claims.

Claims 5 and 22-24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Madanshetty in view of RE 31,779, hereinafter Alliger. However, the Examiner is relying on Alliger for its alleged teaching of a method of disinfecting fish tanks using a disinfectant in combination with ultrasonic cavitation. Applicant submits that that portion of Alliger does not overcome the deficiency of Madanshetty.

Claims 32 and 33 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Madanshetty in view of U.S. Patent No. 6,476,622, hereinafter Robinson. The Examiner is relying on Robinson for its alleged teaching of cavitation impingement of a living organism and microscopic cleaning of a dead or living shell fish. However, Applicant submits that that portion of Robinson does not overcome the deficiency of the rejection based on Madanshetty that is discussed above.

Accordingly, in view of the foregoing remarks, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections.

The Examiner is reminded that the present application has been granted special status. Accordingly, Applicant respectfully requests that the Examiner telephone the undersigned attorney in order to expedite prosecution of the application in the event that any further issues arise.

During the interview, the Examiner identified two new patents, U.S. Patent No. 5,694,936, hereinafter Fujimoto, and U.S. Patent No. 5,601,526, hereinafter Chapelon.

The Examiner speculated whether the signal illustrated in Figure 8 of Fujimoto was a "partially rectified" signal. Applicant submits that the signal illustrated in Figure 8 is phase modulated so as to intermittently shift the phase of the driving signal 180 degrees. See column 7, lines 1-13. This results in a very brief period of rectification.

Fujimoto states that the cavitation gradually grows until the phase of the ultrasonic wave is inverted. At that point, the cavitation receives a pressure opposite to that of growth and "the cavitation thus grown is destroyed".

As Fig. 8 illustrates, Fujimoto discloses a phase modulation provision which periodically reverses an upcoming negative-going phase, 180 degrees for one half cycle as shown at the start and ending points of T. The rectification is followed by a completion of two full micro-bubble growth and size reduction cycles. The stated objective is to collapse and destroy growing cavitations. Fujimoto relies upon established ratios to determine when the phase is shifted. It does not rely upon the detection of cavitation by sensors to determine the duty ratio.

In the Fig. 8 example, bubble growth follows the ***rectified diffusion*** process where during the negative going pressure wave application the bubble gets larger. However, during the follow-on positive going pressure wave, the amount of bubble size shrinkage is insufficient to return the bubble to the size it was before the application of the negative going pressure wave. This results in a net growth in bubble size with each cycle, and eventual cavitation. The application of the additional one positive half-wave per T cycle merely lengthens to time from bubble inception to its resonant collapse.

All of the claims of the present application state that the transducer signals are generated based on a sensor which detects the presence of inertial or transient cavitation. Thus, the duty ratio in the present application is determined completely differently than the determination of the Fujimoto signal. Furthermore, all of the claims indicate that ***stable*** cavitation is created. That is the purpose of rectifying the signal. In the present application, the signal is rectified sufficiently to create stable

cavitation. This is also contrary to Fujimoto, which inadvertently creates inertial or transient cavitations.

With regard to Chapelon, all signals therein are equal on both sides of the abscissa. Therefore, as set forth above, none of those signals are rectified so as to maintain stable cavitation.

Accordingly, in view of the foregoing amendments and remarks, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections. In the event that there are any questions concerning this response, or the application in general, the Examiner is encouraged to telephone the undersigned attorney.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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By: 
William C. Rowland
Registration No. 30888

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620